Revised 5/28/99

34th ESLAB Symposium
The 3-D Heliosphere at Solar Maximum

ESTEC, 3-6 October, 2000
http://solarsystem.estec.esa.nl/eslab34/eslab34_page.htm

Determination of Three-Dimensional Geometry of Coronal Streamers using LASCO Data

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The structure of the outer corona as revealed by the SOHO/LASCO coronagraphs is dominated by bright ray-like streamers which may persist for days or weeks. From analysis of approximately 1 month of SOHO/LASCO C3 coronagraph images, we have determined in three-dimensions the locations of 8 bright ray-like radial "streamers" seen in the outer corona, R > 3 R(SUN). Comparison of the steamers' locations (longitude and latitude at the source surface) with that of the current sheet as computed from a potential-source-surface model shows that all of the streamers lie in or near the heliospheric current sheet. The potential-source-surface magnetic model is used to map the locations of the streamers from the source surface to the photosphere. We find that many of the streamers are associated with strong magnetic field active regions. When the streamers and active region are both visible, the active regions are seen to be bright in the SOHO/EIT data.

From a previous analysis of SOHO/LASCO C2&C3 images near solar minimum, Wang et al. (1997) found that the bright streamers seen in the coronagraph images were the results of line-of-sight viewing of a convoluted or "folded" uniform density heliospheric plasma sheet and not a result of coronal density enhancements. In our analysis of a more active SUN, not all of the steamers lie at folds in the current sheet. This, along with their associations with active regions, leads us to conclude that some of the bright streamers are apparently the result of scattering from regions of enhanced density, associated with active region outflow, and not a result of line-of-sight viewing, consistent with the suggestion by Wang et al. (2000).

Wang, Y.-M. et al., Origin and evolution of coronal streamer structure during the 1996 minimum activity phase, Ap. J. 485, 875 (1997).

Wang, Y.-M., Sheeley, N. R., Jr., and Rich, N. B., Geophys. Res. Lett. 27, 149 (2000).